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ABSTRACT

The potential uses of microcomputers in evaluation research are discussed in this pamphlet. At the beginning, a matrix is provided showing the relationship between the steps in the evaluation research process and common types of computer software. Thereafter, the guide is organized sequentially around the evaluation research activities that are listed down the side of the matrix: (1) proposals and planning, (2) study management, (3) data collection, (4) data analysis and interpretation, and (5) reporting. The discussion relates the characteristics of the different types of programs and their utility to each of these steps in the evaluation research process. Types of software discussed in relation to these activities include word processing, databases, test generation, calculations/statistics, graphics, and telecommunications/networking programs. (TE)

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EVALUATION GUIDES

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Guide Number 1

MICROCOMPUTERS AND EVALUATION

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The potential uses of microcomputers are discussed in relation to such evaluation research tasks as:

- Planning and Proposal Development
- Study Management
- Data Collection and Data Analysis
- Reporting

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Evaluation research typically follows a process which begins with the clarification of a problem and the development of a plan or, more formally, a proposal for a particular way of addressing the problem. That plan usually contains designs for managing the study, for data collection, and for data analysis, synthesis, and interpretation. Some provisions for reporting the results of the study are usually included as well. Microcomputers can be used to facilitate both planning and implementing each of these steps.

Figure 1 is a matrix showing the relationship between the steps in the evaluation research process and common types of microcomputer software. Programs may be written by the user with the aid of a programming language (e.g., BASIC, Pascal, COBOL). They may be in the form of general purpose pre-packaged programs which are designed to accomplish a class of tasks such as is subsumed by the concepts of word processing or data base management. These packages can be tailored to meet the requirements of many different tasks within a group of tasks. Programs may also be designed to accomplish a certain kind of task in a particular way with little opportunity for modification. This is the case with some statistical packages and some accounting packages, for example.

Figure 1
Matrix of Evaluation Research Tasks
and Related Types of Software Programs

Activities	Word Proces.	Data Bases	Test Genera.	Calc/ Stats	Graphic Present.	Telecom/ Network.
Proposals & Planning	X	X		X	X	X
Management	X	X		X		X
Data Collection		X	X			X
Data Analysis & Interpre-tation		X		X	X	X
Reporting	X				X	X

This guide is organized around the activities that are listed down the side of the matrix in Figure 1. The discussion relates the characteristics of the different types of programs and their utility to the steps of the evaluation research process. For more extensive discussions of the various types of microcomputer programs, see Gray (February 1984, May 1984, August 1984), Gray

and Deck (1983), Spuck and Atkinson (1983), Talley (1983) and the various program specific reviews in computer magazines referenced in these sources.

PLANNING AND PROPOSAL DEVELOPMENT

It is in situations where repetitive activity occurs that microcomputer programs are of the greatest potential benefit. These situations include producing multiple drafts of documents, making repeated calculations, and reporting similar information in slightly different formats. Planning and proposal development usually include all of these.

The initial conceptualization of a study typically relies on the use of words. A statement of the problem as the researcher sees it, a review of the relevant literature, the description of the proposed solution are all standard parts of research plans or proposals. And, they usually have to be presented in a pre-specified format. These often go through many drafts in the planning process. Programs that help one manipulate words, that is, word processing programs, make microcomputers useful in planning and proposal development. They have features that make the typing of text and its editing, formatting and printing very convenient.

Developing a proposed budget is also an important part of the planning process. All-purpose or generic electronic spreadsheet programs provide a ledger format for use in laying out the line items of a budget. As the details of a plan are finalized, its budget changes, too. The ability to automatically recalculate budget figures based on pre-defined relationships between the cells in a spreadsheet means that it is a simple matter to make budget projections under changing conditions with spreadsheet programs.

Large data banks and data base programs can be useful for doing the literature review at the initial stages of a study. Data banks such as that represented by ERIC can be very helpful in finding research related to a particular study. Through the use of telecommunications, various data banks can be searched. The information from these sources and from more conventional manual searches can be entered into a data base of references organized by author, subject, and so on. From these records, specific information and references can be extracted for inclusion in a proposal, for example, as direct quotations or as general references. Data base programs provide the flexibility to take one standard set of information and organize it in many different ways.

Setting up the schedule of activities for a study can be accomplished using a general program, such as one for word processing, or a specific project management program. What is needed is some way to organize the events of the study along a time line. This can be done under column headings such as event, date, cost, and responsibility using a word processing program. It can also be done in the form of a PERT or other such chart. Using the microcomputer to set up and revise the study schedule provides an advantage, in that as conditions change, new versions of the schedule can be generated and printed. This alleviates the necessity of having to manually reproduce those parts of the schedule that stay the same from one draft to the next.

STUDY MANAGEMENT

The ongoing management of a study encompasses many different tasks. These include developing and monitoring data collection techniques, accounting for program expenditures, maintaining study timelines, and reporting program progress.

The development of data collection procedures can in many cases be aided by microcomputers. In Data for Decisions, Hoaglin, Light, McPeek, Mosteller, and Soto (1982) list three types of studies: cause and effect, status quo, and prediction. Each type has several designs related to it. For example, cause and effect studies include experiments as well as comparative observational studies. Status quo studies include sample surveys, longitudinal studies, and case studies. Prediction studies include simulations, mathematical modeling, and studies of introspection and advice.

The test and observation protocols used in experimental studies and the survey instruments used in status quo studies can be generated, formatted, and printed using generic word processing programs. In some cases a data base management program may be used to maintain, sort, and select among a large pool of potential items for a particular purpose. Special canned instrument development programs which are a form of data base programs are also available, or one can be created for a specific bank of items.

One of the most valuable uses of microcomputers in educational settings is to engage learners in simulations. Such programs can be used in prediction studies, for example, to evaluate likely future administrative behavior through "in-basket" simulations. As the power and speed of microcomputers continue to grow, they become even more attractive tools for use in the development of mathematical modeling procedures, another form of prediction study. Increased power

and speed also will make them useful in regard to complex procedures which involve the repeated manipulation of information such as introspection and advice studies.

Clearly, word processing, data base management, and various special programs can make microcomputers valuable tools in the refinement of data collection procedures. Similarly, electronic spreadsheet programs and accounting programs are convenient and effective tools for monitoring program costs and projecting expenditures. The programs that were used to set up the study budget and the study timeline in the first place can facilitate updating costs and target dates. These provide efficient vehicles for monitoring data collection and for managing the study as a whole. Of course, word processing programs are useful in the ongoing reporting of study progress.

DATA COLLECTION AND DATA ANALYSIS

In addition to being useful in the development of data collection procedures, some software can also facilitate the collection and analysis of data. There are programs which can be used by interviewers to conduct telephone surveys. And there are programs that collect data directly from subjects in a more or less obvious fashion depending on their purpose. Many of these programs have routines built into them to analyze the data collected.

A growing body of statistical software for data analysis is accumulating. These range from simple inexpensive programs to those which emulate the complexity of mainframe programs. Almost every type of statistical analysis can be found, including exploratory data analysis techniques (see, especially, Carpenter, J., Deloria, D., and Morganstein, D., 1984).

Many statistical programs can provide numerical syntheses of data, and also graphic presentations. In addition, there are graphics programs which can take a data file and create line, bar, pie, and three-dimensional graphs. Some spreadsheet programs are integrated with very sophisticated graphics programs. Using graphics can be a great assistance in the interpretation of a study's results by the researcher, as well as others.

For data that include information other than numbers, data base or file management programs can be very useful in collection, analysis, and interpretation. Such programs facilitate the sorting and selection of data with particular characteristics, for example, subjects from certain areas or with

particular interests. If, after analysis, other characteristics appear to be important, a data base program can be used to reorganize the records in a file and present the results from a different perspective.

If data have been collected at remote sites, it is often advantageous to be able to telecommunicate them to a central location. They can then be acted upon by the appropriate program. This may mean a mainframe program if the data set and/or analysis is too complex for a microcomputer. In such a case, a microcomputer can act as a dumb terminal to just transmit and receive information, or as a smart terminal in order to interact with the larger, more powerful computer.

REPORTING

Reporting, like planning, is an activity which relies mainly on words. However, in addition to word processing programs, graphics programs can greatly enhance the effectiveness of a written or oral report. There are some integrated software programs that combine word processing, data base management or spreadsheets, and graphics programs. Such programs can provide an efficient way to pull together the results of a study. But even the separate output from a word processing program, and a data base, spreadsheet, or graphics program can be easily combined to produce effective reports. Reports thus generated can be transmitted via telecommunication networks to sponsoring agencies or other interested audiences.

In summary, custom designed, generic, or special purpose programs make it possible to use microcomputers at every step of the research process. However, the availability of such programs does not mean that the adoption and implementation of microcomputer use will be easy. In the next section, the problems surrounding the use of microcomputers for evaluation research are discussed.

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